

ART. III. *Reports of five cases of Wounds of Arteries, treated by Compression, with Observations.* By T. S. KIRKBRIDE, M. D.

CASE I. *Puncture of the Radial Artery, near the Wrist.*—J. W. ætat. 30, a carpenter by profession, enjoying good health, punctured the radial artery of the left arm, just above the wrist joint, on the 13th of July, 1838. The wound was made by a sharp pointed knife with which he was working, and although he attempted to control the haemorrhage, by grasping the upper part of the fore-arm, with his hand, it was still so copious, that the marks of the jets could be seen on the pavement for four or five squares, from the spot where the accident occurred.

A tumour, about the size of a hickory-nut had formed before he arrived at my office, and the blood still flowed in jets. Moderate pressure with the thumb, immediately over the orifice, arrested the haemorrhage, and by continuing to press firmly upon the part for a few minutes, the thrombus was dispersed.

The patient was anxious to be cured without an operation, and I determined to employ compression. A graduated compress, extending one inch above and below the wound, was placed upon the artery and secured by a roller firmly applied and extending from the fingers to the elbow. The limb was then bound to a splint, reaching from the upper part of the fore-arm, to the distance of two inches beyond the points of the fingers. The hand was directed to be kept in an elevated position.

On the tenth day after the occurrence of the accident, the dressings were carefully removed; there had been no bleeding whatever, the puncture had healed, and the pulsations of the artery below were as distinct as on the opposite side. A compress was again applied without the splint, and four days afterwards he returned to his work. Some stiffness of the joints for a few days, produced by the perfect rest to which the parts had been subjected, was the only inconvenience he ever suffered.

CASE II. *Complete division of the Radial Artery at the Wrist.*—This accident occurred in the same individual who was the subject of the preceding case. Two weeks after the occurrence of the first accident, he wounded the same artery with a chisel, just above its bifurcation at the root of the thumb. The chisel passed obliquely inwards, forming a flap of the muscles and integuments, and making a complete section of the vessel. The haemorrhage was arrested by a compress, firmly bound upon the part, but

that we call such a property, *pulsatility*, so as to correspond with *irritability, contractility, &c.* For when one argues about the *irritability* of certain structures, as the venous radicles, capillaries, &c., it is sometimes hard to know what is implied, whether it be an *alternate action* in the vessels, or a mere *gradual contraction* and subsequent dilatation of the same.

some slight exertion soon caused a renewal of it, and when I saw him, after having walked half a mile, the handkerchiefs with which he had bound up the wound, were completely saturated with blood. Pressure controled the bleeding, and precisely the same plan of treatment was adopted as in the former instance.

The dressings were removed on the sixth day. The wound had united by adhesive inflammation, and on the following day he resumed his occupation. He has suffered no inconvenience since.

CASE III. Puncture of the Femoral Artery.—A schoolmaster, residing in the northern section of the city, was sitting in front of his desk, along the inclined lid of which his open pen-knife commenced rolling, and, to arrest it in its fall, he drew his thighs together rather suddenly, and unfortunately just at the moment to catch it between them. The blade was forced deeply into the right thigh, puncturing the femoral artery about midway between the knee and groin. A profuse gush of blood followed immediately, and the patient soon became faint. He was seen shortly after, by a highly respectable physician in the neighbourhood, who applied a graduated compress over the wound, and made pressure by means of a tourniquet, with sufficient force to arrest the hemorrhage, without entirely stopping the circulation in the artery.

When Dr. J. R. BARTON saw the patient in consultation, he found him still labouring under all the usual symptoms of a great loss of blood—cold skin, feeble pulse, anxiety of countenance, and great prostration. As the bleeding had entirely ceased, he applied firmly and with great care, a bandage from the toes to the upper part of the thigh, elevated the limb, and caused perfect rest of the part to be maintained. This treatment was faithfully persevered in, for upwards of three weeks. The wound healed, and the recovery was perfect. The patient never suffered in consequence of the accident, and there was no impediment to the circulation.

CASE IV. Bayonet Wound of the Brachial Artery.—S—, a respectable merchant of this city, suffering from near-sightedness, when walking in the street near night, met a person trailing a musket, with the bayonet fixed. Mr. S. walked directly against the point of the bayonet, which penetrated his arm near the axilla, and wounded the brachial artery just below its commencement. He felt the blood flowing down his arm, and also along his body—he became faint, but revived sufficiently to reach his residence. When seen by Dr. BARTON soon afterwards, he was excessively prostrated, his pulse almost imperceptible, his skin cold, and the blood still flowing from the wound. The vessel was not entirely severed. But for his great debility, Dr. B. would have immediately applied a ligature; but deemed it under all the circumstances of the case, most prudent to defer an operation to a subsequent period, particularly as the hemorrhage was controled with-

out difficulty. The proper means for exciting reaction were resorted to, and a roller, applied with great care, from the point of the fingers upwards, secured a graduated compress immediately over the wound. An angular splint was bound to the arm by another roller, and the whole secured firmly to the body.

On removing the outer dressings, the greatest care was observed to prevent motion, and the injured part was not disturbed for three weeks from the occurrence of the accident. There was no suppuration, and the cure was perfect. So extensive was the effusion of blood into the cellular tissue, that the discoloration extended along the arm, nearly to the elbow—down that side of the body almost to the pelvis, and from the median line in front, to a corresponding point behind.

CASE V. Complete division of the Radial Artery.—A workman, employed at the Masonic Hall, in this city, several years ago, wounded his arm just above the wrist, and divided the radial artery completely, with a cutting instrument. The hemorrhage was copious, but easily controled by pressure. Precisely the same plan of treatment was adopted as in the previous cases, and the result was entirely successful. The patient has never experienced any inconvenience from the injury. He was able to resume his work, three weeks after the accident.

Observations.—Wounds of arteries are among the most important accidents the surgeon is called upon to treat; alarming to the patient and the by-standers, they require from the professional attendant, presence of mind and promptness of action. Unskilful treatment exposes the patient to a serious train of evils, if not to loss of life.

Of the five cases above related, two have recently occurred in our own practice, the others have come to our knowledge in the practice of a friend, of the highest standing in the profession. They are not presented with the view of placing compression before the ligature in the treatment of these accidents, or as justifying its general adoption. They possess considerable interest, however, from the variety of vessels injured, and show how much may be effected by the recuperative powers of the system, when judiciously assisted.

We have long been satisfied that many wounds of arteries, particularly those of the extremities, even when in vessels of considerable size, might, under favourable circumstances, be safely and successfully treated by compression. While resident surgeon to the Pennsylvania Hospital, our attention was particularly directed to this point, and the conclusions to which we arrived, were similar to those deducible from the cases we have just reported. In this institution, in which most of the accidents that happen in the city of Philadelphia, are received immediately after their occurrence, and where cases of hemorrhage from wounded arteries were not unfrequent during our

residence, we were surprised to find, in how large a number, the ligature was rendered unnecessary, by the employment of well directed pressure. Whenever we believed the hemorrhage could be controled by compression, it was invariably resorted to, and out of a large number of cases thus treated, we do not recollect a single one that terminated unpleasantly.

We are perfectly aware that greater facilities for the treatment of such cases exist in the wards of a well-regulated hospital, than can be found in private practice. When, however, the subject is not too fleshy—when pressure can be made directly upon a bone, and there is no peculiarity forbidding its employment upon the entire limb—when the patient is disposed to second the wishes of the surgeon, and where, in fine, the surgeon himself is willing to undergo the trouble and anxiety such cases are likely to give him—when all or most of these circumstances co-exist, compression may be safely tried in many of the wounds of arteries of the extremities.

When called to a case in which the hemorrhage has been completely arrested by compression, or where the patient is excessively prostrated, as occurred in Case IV—where an operation is strenuously objected to, or where the attendant himself may feel unwilling to undertake it, this plan of treatment should have a fair trial, and will often succeed. Should it fail, however, the operation may still be performed, and often with greater satisfaction to the patient, who is then convinced that all other means must prove unavailing.

Where the bleeding is repressed after the accident, its recurrence is very often to be attributed to the careless manner in which the dressings are applied, and the want of that perfect rest, which is absolutely essential to the safe treatment of these injuries. By *perfect rest*, we mean that state of a part in which the patient can neither voluntarily nor involuntarily produce the slightest motion. This state can only be obtained by the use of an inflexible splint, accurately adjusted and firmly secured to the limb.

Perfect rest, important as it is in the treatment of many surgical diseases, may be abused and made productive of unpleasant consequences, particularly to the joints; passive motion enough to obviate this last, may almost always be made at the proper time by the careful surgeon—it should never be entrusted to a patient or to nurses.

Another common cause for the return of hemorrhage, or the formation of aneurism, is the too early or too violent use of the limb, after the wound in the vessel is supposed to be closed; by which means, the lymph not yet consolidated is torn open.

Although what we conceive to be the only fair means of trying compression may be deduced from the treatment adopted in the cases above reported, still its importance will justify some repetition. When called to a case of wounded artery, the first step is to arrest the circulation above the seat of injury, to adjust the lips of the wound accurately, and to secure them with strips of adhesive plaster. A roller of proper width, extending from the

toes in the lower, or the fingers in the upper extremity, is to be carefully and firmly applied as high up as the injury, where it is made to secure a graduated compress, extending a short distance above and below the wound. An inflexible splint, bound to the limb by a second roller, completes the apparatus. Care is to be taken to place the injured extremity in the best position, and if serious bleeding is apprehended, the patient should be carefully watched. This plan of treatment should be persevered in for three or four weeks, and frequently for a longer period. When it is deemed advisable to remove all or a portion of the dressings, it should be done with the greatest care, and without the slightest motion of the injured part. The first movements of this part should be of the gentlest character, and some support should, for a short period, be given to the injured vessel.

If the dressings are well applied, and the limb kept in the proper position, a moderate degree of pressure is generally sufficient to control the hemorrhage—often without materially impeding the circulation in the artery.

Lymph is always effused from the cut edges and coats of the vessel, and if sufficient time is allowed to elapse for its consolidation, we have every reason to hope for a favourable termination of the case. We do not recollect a single unsuccessful case, where this plan of treatment has been faithfully carried out in all its details.

Cases I. and III.—wounds of the radial and femoral arteries—were punctures in which very little if any impediment to the flow of blood was produced by their cure. Cases II. and V. were examples of perfect division, and the cure was effected by adhesion of the sides of the vessel. Case IV. appears to have been of the same character, the artery below being filled by the anastomotic branches. In cases III. and IV., the ligature would have been immediately applied, but from the fact that the hemorrhage was perfectly controled by the means first resorted to, and the treatment subsequently instituted rendered the operation unnecessary. The subject of the first and second cases, certainly exposed himself to danger by so early a return to his occupation, which was done entirely on his own responsibility.

These cases, then, are facts, illustrating the importance of careful dressings, and going to show that under favourable circumstances, wounds, even of large arteries, may be cured by compression. The particular cases in which it ought to be resorted to, must, after all, be very much left to the tact and good sense of the surgeon, and where doubts exist, it will always be safer to cut down to the vessel, and employ the ligature.

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